

## PATENT ABSTRACTS OF JAPAN

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## (54) POLARIZING FILM AND POLARIZING PLATE

## (57)Abstract:

**PROBLEM TO BE SOLVED:** To develop an iodine-based polarizing film that hue as neutral as possible is obtained when disposed in the cross-Nicol position and as a result a color liquid crystal display device having good black display and excellent reproducibility of colors can be formed.

**SOLUTION:** The film consists of a stretched film 1 containing iodine, and has such property that when the film is disposed in the cross-Nicol position, the ratio of the absorption peak A in a 550 to 650 nm wavelength region to the absorption peak B in a 450 to 520 nm wavelength region in the absorbance characteristic of the film is  $\leq 1.5$ . The polarizing plate is produced by forming a transparent protective layer 2 on one surface or both surfaces of the polarizing film. Thus, the film causes little leak of light when disposed in the cross-Nicol position, and has excellent mass-productivity.



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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the polarization film of the suitable iodine system for formation etc. of the liquid crystal display of the colored presentation which is excellent in the reproducibility of a color, and its polarizing plate.

[0002]

[Background of the Invention]Conventionally, the hydrophilic high polymer film was made to impregnate iodine, and the polarization film which carries out stretching treatment was known. Realizing the colored presentation where this polarization film is used for the liquid crystal display etc. and which is excellent in the reproducibility of a color in that case is expected to attain a perfect black display as much as possible.

[0003]When it had arranged to cross Nicol, the polarization film which provides neutral hue could realize the aforementioned perfect black display, but if it was in the conventional polarization film, when it had arranged to cross Nicol, it did not become neutral hue, but there was a problem which the strong coloring by light leaking generates.

[0004]

[Technical problem of invention] This invention makes SUBJECT development of the polarization film of the iodine system which can form the liquid crystal display of the colored presentation which provides neutral hue as much as possible, and is excellent in the reproducibility of a good black display and by extension, a color, when it has arranged to cross Nicol.

[0005]

[Means for Solving the Problem]A polarization film, wherein absorption peak B in absorption peak [ in the wavelength range of 550-650 nm in the absorbance characteristic in a case of this invention having consisted of an oriented film of iodine content, and having arranged it to cross

Nicol ] A / the wavelength range of 450-520 nm is 1.5 or less, And a polarizing plate which provides transparent protection layer in one side or both sides of the polarization film, and is characterized by things is provided.

[0006]

[Effect of the Invention]According to this invention, when it has arranged to cross Nicol, the polarization film which there is little light leaking and is excellent in blackness thru/or neutral hue nature can be obtained, and the liquid crystal display of a good black display and by extension, the colored presentation which is excellent in the reproducibility of a color can be realized using it. It excels that it is a polarization film of an iodine system also in mass production nature.

[0007]

[Mode for carrying out the invention]The polarization film by this invention consists of an oriented film of iodine content, and absorption peak B in absorption peak [ in the wavelength range of 550-650 nm in the absorbance characteristic in the case of having arranged it to cross Nicol ] A / the wavelength range of 450-520 nm consists of 1.5 or less thing.

[0008]A polarization film more desirable than the point of strengthening of the blackness by reduction of the light leaking in the case of having arranged to cross Nicol, i.e., neutral hue-izing, said absorption peak A carried out -- based on it in the wavelength range of 580-620 nm, and the ratio of absorption peak B, and absorption peak A / absorption peak B according to it in the wavelength range of 460-490 nm above all, it is especially 1.2 or less thing 1.3 or less above all 1.4 or less. When the peak ratio exceeds 1.5, there is much light leaking in the case of having arranged to cross Nicol, coloring strong at the light leaking is produced, and the display quality of a black display falls greatly.

[0009]Manufacture of a polarization film, for example A polyvinyl alcohol system film and a partial formal-ized polyvinyl alcohol system film, It can carry out by the proper method according to the former, such as wet process which are made to impregnate iodine and carries out stretching treatment within a dyeing bath, conveying the film which consists of hydrophilic giant molecules with a proper ethylene-vinyl acetate copolymer system partial saponification film etc. In that case, dichroism substances other than iodine (for example, dichromatic dye etc.) can also be used together.

[0010]The absorption peak A / the absorption peak B ratio above-mentioned in the above, For example, so that the phase contrast of a film may be measured using 900-nm wavelength light and the phase contrast may not exceed 1100 nm at the time of dyeing and stretching treatment within a dyeing bath, controlling especially 10-70 \*\* of bath temperature [ 15-60 \*\* of ] at 20-40 \*\* above all, The system etc. which carry out stretching treatment 10-1050 nm above all so that it may become the range of 100-1000 nm especially can attain.

[0011]Especially the draw magnification by the above is 2 to 10% 1 to 20% above all 50% or

less of usually.

Although the thickness of the polarization film to form is 5-80 micrometers usually, it is not limited to them.

Achievement of the absorption peak ratio of the above-mentioned purpose depended on this system, i.e., achievement of improvement in the neutral hue in cross Nicol, is because the rate of generation ratio of the poly iodine complex in a polarization film was controlled.

[0012]Namely, the wavelength range of 550-650 nm in which this poly iodine complex influences the determination of the hue of a polarization film greatly, In order to show (absorption peak A) near the 580 - 620 nm-wavelength range, the wavelength range of 450-520 nm, and an absorption peak strong (absorption peak B) near the wavelength range of 460-490 nm above all above all, The hue of a polarization film can be adjusted by controlling the rate of generation ratio of the poly iodine complex.

[0013]The polarization film by this invention can be preferably used for formation of various kinds of Optical Apparatus Sub-Division, such as a liquid crystal display, etc. On the occasion of the practical use, it can also be considered as the polarizing plate which provided more than [ of proper stratum functionale, such as transparent protection layer, thru/or an optical layer / one layer or two-layer ] in one side or both sides of the polarization film. The example was shown in drawing 1. Transparent protection layer and 3 are [ a hard court layer and 4 ] adhesive layers, and 1 is [ a polarization film and 2 ] separators 5.

[0014]The addition of the above mentioned transparent protection layer can use a proper transparent substance for the formation for the purpose of the water resisting property of a polarization film, improvement in handling nature, etc. Above all, the plastic etc. which are excellent in transparency, a mechanical strength and thermal stability, moisture cover nature, etc. are used preferably. Incidentally as the example, polyester system resin and acetate system resin, Polyether sulphone system resin, polycarbonate system resin, polyamide system resin and polyimide system resin, Heat-hardened types, such as polyolefin system resin, acrylic resin or acrylic and a urethane system, an acrylic urethane system, an epoxy system, and a silicone series, thru/or ultraviolet curing type resin, etc. are raised.

[0015]Transparent protection layer may be formed by a system with a proper lamination system through the glue line of what was used as the coating method of a plastic, or the film, etc., and its thickness is also arbitrary. Especially generally let 1-300-micrometer 500 micrometers or less be a thickness of 5-200 micrometers above all. Transparent protection layer shall have fine rugged structure on the surface for the purpose of prevention of sticking, diffusion thru/or an anti glare, etc.

[0016]Formation of the transparent resin layer of surface fine rugged structure, for example Silica and alumina, . Consist of a titania, zirconia and tin oxide, indium oxide and cadmium oxide, antimony oxide, etc. A conductive thing can also be formed by a system with proper

system which makes transparent particles, such as organic system particles which consist of polymer etc. for which a bridge is not constructed [ a certain inorganic system particle, bridge construction, or ], contain, system which carries out the surface roughing process of the surface at sandblasting, mat treatment, etc., etc. As for a transparent particle, generally, \*\*\*\*\* for 5 - 25 weight sections is not limited for a thing with a mean particle diameter of 0.5-20 micrometers to this above all two to 50 weight section per transparent resin 100 weight section.

[0017]On the other hand, a hard court layer is provided for the purpose of surface damage prevention etc., and is usually attached to the outside surface of the transparent protection layer 2 like the example of a figure. The hard court layer 3 is formed as a coating layer etc. of the hardening resin which could be formed with a proper material which is excellent in hardness, and was generally illustrated by the above-mentioned transparent protection layer. According to the transparent protection layer above-mentioned on the occasion of the formation, distributed content of the transparent particle can be carried out for the purpose of anti glare processing etc.

[0018]A polarizing plate shall have the adhesive layer 4 for pasting the one side or both sides with other components, such as a liquid crystal cell, like the example of a figure. Proper slime and binder can be used for formation of the adhesive layer, and there is no limitation in particular in it. What incidentally makes base polymer proper polymer, such as an acrylic polymer, silicone series polymer and polyester, polyurethane and polyamide, polyether and a fluorine system, and a rubber system, as the example is raised.

[0019]It is preferred that it is an adhesive layer which is excellent in optical transparency, shows the adhesion characteristics of a moderate wettability and cohesiveness, and an adhesive property, and is excellent in weatherability, heat resistance, etc. like acrylic pressure sensitive adhesive above all. Moisture absorption is low and it is more preferred than points, such as a fall of the optical property by prevention of the foaming phenomenon by moisture absorption, or a peeling phenomenon, thermal expansion difference, etc., curvature prevention of a liquid crystal cell, and by extension, the plasticity of a liquid crystal display that is excellent in endurance for high quality, that it is an adhesive layer which is excellent in heat resistance.

[0020]The adhesive layer may contain the proper additive agent in which it has been added by adhesive layers, such as resin of a natural product or a compound, a bulking agent which consists of adhesive grant resin, glass fiber, a glass bead and a metal powder, other inorganic powder, etc. above all, paints and colorant, and an antioxidant, for example. An adhesive layer contains the above-mentioned transparent particle, and may show light diffusibility.

[0021]The attachment of an adhesive layer makes the solvent which consists of the independent thing or mixtures of a proper solvent, such as toluene and ethyl acetate, for example dissolve or distribute slime thru/or its constituent, and prepares about 10 to 40weight

% of binder liquid, Proper systems, such as a system which attaches it directly on the predetermined side of a polarizing plate by proper deployment systems, such as a flow casting system and a coating method, or a system which forms an adhesive layer on a separator according to the above, and carries out transfer of it on the predetermined side of a polarizing plate, can perform.

[0022]An adhesive layer can also be provided as a superposition layer of things, such as a different presentation or a kind. The thickness of an adhesive layer shall be suitably determined according to the purpose of use, adhesive strength, etc., and, especially generally shall be 10-100 micrometers 5-200 micrometers above all 1-500 micrometers. When providing in the front, back, and both sides of a polarizing plate, those adhesive layers may have a presentation, a the same kind, etc., and may differ.

[0023]It is preferred to carry out tentative installation covering with the separator 5 for the purpose of a pollution control etc. until it presents practical use with the adhesive layer like the example of a figure, when an adhesive layer is exposed to an outside surface. The system etc. which establish the exfoliation coat by proper removers, such as a silicone series, a long chain alkyl system, a fluorine system, and a molybdenum sulfide, in the proper Usuha object if needed can perform formation of a separator.

[0024]Proper things, such as a plastic film, a rubber sheet and paper, cloth and a nonwoven fabric, a network and a foaming sheet, metallic foils, those lamination objects, can be used for the aforementioned Usuha object, for example. The thickness of the Usuha object shall be suitably determined according to intensity etc., and, especially generally shall be 10-200 micrometers 5-300 micrometers above all 500 micrometers or less.

[0025]The aforementioned separator can also be used as the protective film aiming at the damage prevention on the surface of a polarizing plate, etc. That is, although a separator enables it to exfoliate in an interface with the adhesive layer which it pastes up, when a protective film exfoliates the Usuha object from a polarizing plate, it enables it to exfoliate with an adhesive layer, therefore, in the case of a protective film, the surface of a polarizing plate exposes it by the exfoliation.

[0026]The polarizing plate by this invention may be a thing etc. of the form which added the proper optical layer used for formation of a liquid crystal display, etc. like the elliptic polarization plate which laminated the phase difference plate and the superior lamella for luminosity, or the upper polarizing plate for luminosity. Although this optical layer can be added also by the system separately laminated one by one by the manufacturing process of a liquid crystal display etc., there is an advantage in which what carried out lamination addition beforehand is excellent in stability, assembly-operation nature, etc. of quality, and raises the manufacturing efficiency of a liquid crystal display etc., and it deals.

[0027]There may not be any limitation in particular about the kind of optical layer to add,

therefore a polarizing plate may be a reflection type thing etc. The aforementioned phase difference plate may also have the proper purposes, such as one half, a wavelength plate of  $1/4$  grades, and viewing-angle compensation. In the case above mentioned lamination type like \*\*\*\*\* , the lamination may be performed via an adhesion means with a proper adhesive layer etc.

[0028]The above mentioned reflection type polarizing plate is what provided the reflecting layer in the polarizing plate, and is for forming the liquid crystal display etc. of the type which is made to reflect the incident light from the visual recognition side (display side), and is displayed.

Built-in of light sources, such as a back light, can be omitted, and it has an advantage, such as being easy to achieve slimming down of a liquid crystal display.

A system with a proper system etc. which attach the reflecting layer which becomes one side of a polarizing plate from metal etc. via transparent protection layer etc. if needed can perform formation of a reflection type polarizing plate.

[0029] That is, what attached the foil and the vacuum evaporation film which consist of reflexivity metal, such as aluminum, to one side of the transparent protection layer which carried out mat treatment as an example of a reflection type polarizing plate if needed, and formed the reflecting layer in it is raised. What was provided on the transparent protection layer of transparent particle content, and was made into the reflecting layer of surface fine rugged structure is raised.

[0030]The reflecting layer of the above mentioned surface fine rugged structure diffuses incident light by scattered reflection, prevents directivity and the appearance [ GIRAGIRA / appearance ], and has an advantage etc. which can control the nonuniformity of light and darkness. Formation of the reflecting layer of the fine rugged structure in which the surface fine rugged structure of transparent protection layer was made to reflect can be performed by the method of attaching metal directly on the surface of transparent protection layer, for example by a system with proper vacuum evaporation systems, plating systems, etc., such as a vacuum deposition system, an ion plating system, and a sputtering system, etc.

[0031] On the other hand as an example of the above-mentioned phase difference plate, polycarbonate and polyvinyl alcohol, Polystyrene, polymethylmethacrylate and polypropylene, and other polyolefines, What supported with the film the birefringence film which carries out stretching treatment of the film, the oriented film of a liquid crystal polymer, and the orientation layer of a liquid crystal polymer which consist of proper polymer like polyarylate or polyamide is raised.

[0032] A phase difference plate may be the inclined orientation film which may have the proper phase contrast according to the purpose of use, and controlled the refractive index of the thickness direction. It may be what laminated two or more sorts of phase difference plates, and